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ABSTRACT

This data brief presents the results of the 1997 Survey of Doctorate Recipients (SDR). The survey questions target information on the labor market outcomes of recent doctorate holders. The results of the science and engineering (S&E) doctorate holders survey point out a difference between initial plans and employment due to changing plans during the course of graduate school or other factors. The characteristics of academic jobs and factors related to academic job characteristics are also discussed. (YDS)

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SRS Issue Brief

Academic Employment of Recent Science and Engineering Doctorate Holders

by
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NATIONAL SCIENCE FOUNDATION
Directorate for Social, Behavioral, and Economic Sciences

ACADEMIC EMPLOYMENT OF RECENT SCIENCE AND ENGINEERING DOCTORATE HOLDERS

by Thomas Hoffer and Lance Selfa

Division of Science Resources Studies

ISSUE BRIEF

July 13, 2001

Sixty-five percent of recent S&E doctorate holders holding academic positions are employed at four-year colleges and universities.

Electronic Dissemination

SRS data are available through the World Wide Web (http://www.nsf.gov/sbe/srs/). For more information about obtaining reports, contact paperpubs@nsf.gov or call 301-947-2722. For NSF's Telephonic Device for the Deaf, dial 703-292-5090.

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A recurring issue in graduate education concerns the ability of graduates to find employment in careers consistent with their expectations. Drawing upon data from a national sample of recent science and engineering (S&E) doctorate holders[1] collected in the 1997 Survey of Doctorate Recipients (SDR), this Issue Brief addresses the following questions about the labor market outcomes of recent doctorate holders: To what extent are recent doctorate holders entering academic[2] versus non-academic employment and are those entering academia employed in tenure-track jobs? And to what extent are the types of academic jobs obtained associated with background characteristics like field of study, sex, and race/ethnicity?

Academic versus Non-Academic Employment

Most individuals who attain doctorates enter graduate school with plans to teach after graduation. Of the recent S&E doctorate holders surveyed in the 1997 SDR, almost two-thirds (64 percent) indicated teaching was their career choice when they started graduate school. However, a much smaller number actually accepted an academic position in the critical first years after doctoral completion. Furthermore, some of those who accepted an academic position had not planned to teach. This difference between initial plans and employment may result from various factors such as changing plans during the course of graduate school or success in efforts to obtain a position in one's sector of first choice.

Overall, 47 percent of recent S&E doctorate holders were employed in the academic sector, 49 percent were employed in a non-academic sector, and 4 percent were not working in 1997 (table 1). Across the broad fields of graduate education from which the respondents earned their doctorates,[3] recent life sciences doctorate holders were most likely and engineering doctorate holders were the least likely to be employed in academia.

In terms of demographic backgrounds, a higher percentage of females than males were employed in academia, as were higher percentages of blacks, Hispanics, and non-Hispanic whites, compared to Asians/Pacific Islanders. These differences by sex and race/ethnicity reflect in part the differences among these groups in their doctorate fields. Women compared to men are more likely to earn their doctoral degrees in the life sciences or social sciences than in the physical sciences or engineering, and doctorate holders in the life sciences and social sciences are more likely to be employed in the academic sector. Similarly, Asians/Pacific Islanders are more highly represented in engineering than in social sciences, a factor related to being less likely to be employed in the academic sector.[4]

Characteristics of Academic Jobs

The recent doctorate holders employed in academic sector (table 2) are mainly concentrated in four-year colleges and universities, which employ 65 percent of this population. Medical schools employ the next largest

[1] The 1997 SDR questionnaire asks respondents to report whether they received their first U.S. doctoral degree between June 1990 and June 1996; those indicating 'yes' to this question are defined as "recent doctorate holders" used throughout this report. All SDR data cited in the issue brief are based on this subsample applicable only in 1997.

[2] "Academia" or "academic sector" is defined as postsecondary institutions (2-year college, 4-year college/university, medical school, and university-affiliated research institute). Academic employment or positions may include faculty, postdoctoral scholars ("postdocs"), full-time researchers, and administrators, etc. Academic employment or positions may be tenure-track or not, and may or may not require the position-holder to publish research papers or monographs.

[3] Broad fields are defined based on detailed field of doctorate. Physical sciences include chemistry (except biochemistry), physics and astronomy, earth science, geology, and oceanography. Life sciences include agricultural and food sciences, biological sciences, and environmental life sciences. Social sciences include psychology, economics, political science, sociology, anthropology, and the fields of linguistics, geography, philosophy of science, and history of science.

[4] See *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2000*, Arlington, VA, 2000 (NSF 00-327), Appendix tables 4-13 and 4-14 for the breakdowns of doctoral degrees by race/ethnicity and women.

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Table 1. **Percentages of recent S&E doctorate holders in the U.S. employed in academic versus other sectors by broad field of doctorate, sex, and race/ethnicity: 1997**

Background characteristics	Total		Working in academic sector	Working in other sectors	Not working[1]
	Number	Percent	Percent		
Total	119,330	100.0	46.8	49.4	3.8
Field of doctorate:					
Computer and mathematical sciences	8,890	100.0	52.7	46.0	1.3
Life and related sciences	33,930	100.0	61.0	34.2	4.9
Physical and related sciences	20,540	100.0	41.1	55.1	3.9
Social and related sciences	31,570	100.0	49.6	46.5	3.9
Engineering	24,400	100.0	26.3	70.8	2.9
Sex:		100.0			
Male	78,720	100.0	44.0	53.7	2.3
Female	40,610	100.0	52.3	41.1	6.6
Race/ethnicity:[2]					
White	83,570	100.0	49.2	47.1	3.7
Asian/Pacific Islander	28,310	100.0	38.2	58.0	3.8
Hispanic	3,650	100.0	53.3	41.1	5.6
Black	3,270	100.0	53.9	43.6	2.6

[1] Not working includes those unemployed and retired.

[2] American Indian/Alaskan Native and Other race/ethnicity numbers are too small to be shown separately, but are included in the total.

NOTES: Academic sector is defined as all postsecondary institutions (two-year college, four-year college or university, medical school, and university-affiliated research institute). Survey of Doctorate Recipients data only include those who received a research doctorate in science and engineering (S&E) from an U.S. institution. Recent doctorate holders are those who reported as having received their first doctorate between June 1990 and June 1996. Numbers are rounded to nearest ten. Numbers and percentages may not add to total due to rounding.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Doctorate Recipients, 1997

Table 2. **Percentage of recent S&E doctorate holders in the U.S. employed in academic sector by type of institution and tenure track status: 1997**

Tenure track status	Total	Two-year college	Four-year college & university	Medical school	University-affiliated research institute
Total number	55,880	1,890	36,410	11,830	5,740
Total percent	100.0	100.0	100.0	100.0	100.0
Tenured	5.0	21.6	5.7	1.2	3.3
On tenure track	35.8	29.6	46.7	15.4	11.6
Not on tenure track	30.3	48.8	26.4	35.3	38.1
Postdoc	28.9	–	21.2	48.1	47.1

KEY: -- = no case reported.

NOTES: Academic sector is defined as all postsecondary institutions as shown in the table. Survey of Doctorate Recipients data only include those who received a research doctorate in science and engineering (S&E) from an U.S. institution. Recent doctorate holders are those who reported as having received their first doctorate between June 1990 and June 1996. Numbers are rounded to nearest ten. Numbers and percentages may not add to total due to rounding.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Doctorate Recipients, 1997

share (21 percent), followed by research institutes (10 percent), and two-year colleges (3 percent). Tenure status is an important characteristic of academic employment. About half of recent doctorate holders employed at two-year and four-year colleges and universities had tenured or tenure-track positions. The proportion with tenure is highest in the two-year colleges, reflecting the short tenure process in these institutions (often only three years). Very few of the recent doctorate holders in four-year colleges and universities had yet attained tenure, because the tenure process there normally takes seven years. About one-fifth of the recent doctorate holders in academic positions in four-year colleges and universities were postdocs, while about half were postdocs at medical schools and research institutes.

Factors Related to Academic Job Characteristics

Background characteristics, such as field of graduate study, sex, and race/ethnicity, among recent S&E doctorate holders employed in aca-

Recent doctorate holders in computer/math sciences, social sciences and engineering employed in academic sector are more likely to have tenure-track academic appointments than those in life and physical sciences.

demic sector are associated with the different types of employing institutions and tenure statuses (table 3).

Recent computer and mathematical science doctorate holders have the highest concentration in four-year colleges and universities (86 percent). The proportions of recent physical science, engineering, and social science doctorate holders employed by four-year institutions range from 73 to 77 percent. Recent life science doctorate holders are more likely than other recent doctorate holders to work in medical schools (41 percent) and much less likely to work in a four-year college or university.

Women are less likely than men to work in a four-year college or university (61 versus 68 percent), but more likely to work in a medical school (25 versus 19 percent). These differences reflect the higher concentration of women doctorate holders in the life sciences compared to men, and thus the greater likelihood of working in a medical school.

Types of academic employment also vary by race/ethnicity of the recent S&E doctorate holders. Asian/Pacific Islander doctorate holders show the highest proportion working in medical schools (29 percent). Again, this reflects the higher concentration of Asians/Pacific Islanders earning doctoral degrees in the life sciences. Blacks have the highest proportion of all the racial/ethnic categories working in four-year colleges and universities (76 percent).

The tenure status of those employed in academia varies by broad field of doctoral study (table 4). Most likely to be tenured or on a tenure track are recent computer and mathematical science doctorate holders (62 percent), followed by those in the social sciences (53 percent) and engineering (51 percent). In contrast, recent life science (28 percent) and physical science (32 percent) doctorate holders are the least likely. Their early careers are more likely to include a postdoc placement (45 and 39 percent), slowing the transition into tenure-track positions. No statistically significant female-male differences in tenure status are seen, but blacks and Hispanics are more likely than non-Hispanic whites and

Table 3. **Percentage of recent S&E doctorate holders in the U.S. employed in academic sector by type of institution, broad field of doctorate, sex and race/ethnicity: 1997**

Background characteristics	Total		Two-year college	Four-year college & university	University-affiliated research institute	Medical school
	Number	Percent	Percent			
Total	55,880	100.0	3.4	65.1	10.3	21.2
Field of doctorate:						
Computer and mathematical sciences	4,690	100.0	5.8	86.1	5.7	2.5
Life and related sciences	20,690	100.0	2.9	46.1	10.5	40.5
Physical and related sciences	8,430	100.0	3.4	73.2	16.9	6.5
Social and related sciences	15,670	100.0	4.2	75.1	6.6	14.1
Engineering	6,410	100.0	1.1	76.5	13.1	9.3
Sex:						
Male	34,650	100.0	2.9	67.5	10.6	19.0
Female	21,230	100.0	4.2	61.4	9.8	24.7
Race/ethnicity:[1]						
White	41,130	100.0	3.6	66.8	10.3	19.4
Asian/Pacific Islander	10,810	100.0	2.4	58.5	10.5	28.6
Hispanic	1,950	100.0	4.8	59.6	13.2	22.4
Black	1,760	100.0	2.1	75.9	6.4	15.6

[1]American Indian/Alaskan Native and Other race/ethnicity numbers are too small to be shown separately, but are included in the total.

NOTES: Academic sector is defined as all postsecondary institutions as shown in the table. Survey of Doctorate Recipients data only include those who received a research doctorate in science and engineering (S&E) from an U.S. institution. Recent doctorate holders are those who reported as having received their first doctorate between June 1990 and June 1996. Numbers are rounded to nearest ten. Numbers and percentages may not add to total due to rounding.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Doctorate Recipients, 1997

Table 4. **Percentage of recent S&E doctorate holders in the U.S. employed in academic sector by tenure track status, broad field of doctorate, sex, and race/ethnicity: 1997**

Background characteristics	Total		Tenured	On tenure track	Not on tenure track	Postdoc
	Number	Percent	Percent			
Total	55,880	100.0	5.0	35.8	30.3	28.9
Field of doctorate:						
Computer and mathematical sciences	4,690	100.0	7.8	54.5	25.5	12.1
Life and related sciences	20,690	100.0	3.9	24.0	27.4	44.7
Physical and related sciences	8,430	100.0	2.7	28.8	29.2	39.4
Social and related sciences	15,670	100.0	6.7	46.1	36.8	10.3
Engineering	6,410	100.0	5.7	44.8	28.4	21.1
Sex:						
Male	34,650	100.0	4.4	37.1	28.9	29.6
Female	21,230	100.0	6.0	33.8	32.5	27.6
Race/ethnicity:[1]						
White	41,130	100.0	5.4	37.4	31.2	26.0
Asian/Pacific Islander	10,810	100.0	3.7	25.9	27.7	42.7
Hispanic	1,950	100.0	6.1	46.2	24.9	22.8
Black	1,760	100.0	4.7	47.8	29.9	17.6

[1] American Indian/Alaskan Native and Other race/ethnicity numbers are too small to be shown separately, but are included in the total.

NOTES: Academic sector is defined as all postsecondary institutions (two-year college, four-year college or university, medical school, and university-affiliated research institute). Survey of Doctorate Recipients data only include those who received a research doctorate in science and engineering (S&E) from an U.S. institution. Recent doctorate holders are those who reported as having received their first doctorate between June 1990 and June 1996. Numbers are rounded to nearest ten. Numbers and percentages may not add to total due to rounding.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Doctorate Recipients, 1997

Asians/Pacific Islanders to be tenured or in a tenure-track appointment. Asians/Pacific Islanders are the most likely of the racial/ethnic groups to hold postdocs and the least likely to be tenured or in a tenure track. Again, this reflects the concentration of Asians/Pacific Islanders in the physical sciences, engineering, and life sciences, where postdoc appointments are more common than in the social sciences.

Conclusions

Although a sizable majority of recent S&E doctorate holders started graduate school planning to become academics, only about 47 percent actually accept academic employment in the first years after receiving their doctoral degrees. Large differences in the proportions holding tenure or working in a tenure-track job are found among types of employing institution and among graduates from different broad fields of doctoral study. Further analysis of the SDR data could trace the career developments of the recent doctorate holders, including the rates at which individuals starting in academic positions move into non-academic jobs, and vice-versa. Additional work could examine the extents to which the S&E doctorate holders with postdocs and non-tenure-track appointments move into tenure-track jobs, and those in tenure-track positions attain tenure.

This Issue Brief was prepared by Thomas Hoffer, a senior research scientist, and Lance Selfa, a survey analyst, both from NORC at the University of Chicago. For more information on the Survey of Doctorate Recipients, see http://www.nsf.gov/sbe/srs/cdse/start.htm or contact:

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